

CLAIMS

1. A solid-state image pickup device including:

a photosensor portion provided on the surface of a substrate to convert incident light into electric charges;

a transfer portion formed on the surface of said substrate to transfer said electric charges read out from said photosensor portion; and

an overflow barrier formed within said substrate to discharge unnecessary electric charges of said electric charges, wherein potential under said transfer portion is formed smaller than that formed under said photosensor portion along the depth direction of said substrate in a range from the minimum potential position to said overflow barrier.

2. A solid-state image pickup device according to claim 1, wherein said transfer portion has one or a plurality of impurity regions formed at its lower portion.

3. A solid-state image pickup device according to claim 1, wherein said photosensor portion has one or a plurality of impurity regions formed at its lower portion.

4. A solid-state image pickup device according to claim 2, wherein one or a plurality of second impurity regions formed under said photosensor portion are formed with depths different

from that of said impurity region.

5. A solid-state image pickup device according to claim 4, wherein said impurity region is arranged in four layers along the depth direction of said substrate and said second impurity region is arranged in seven layers along the depth direction of said substrate.

6. A solid-state image pickup device according to claim 4, wherein said impurity region is a P type impurity region and said second impurity region is an N type impurity region.

7. A solid-state image pickup device according to claim 1, wherein said potential in said overflow barrier under said transfer portion is smaller than that in said overflow barrier under said photosensor portion.

8. A solid-state image pickup device according to claim 7, wherein said region under said photosensor portion of said overflow barrier has a concentration lower than that of said region in said overflow barrier.

9. A solid-state image pickup device according to claim 1, wherein said overflow barrier is formed at the position deeper than 3 μm from the surface of said substrate.

10. A solid-state image pickup device according to claim 1, wherein said substrate is composed of a first conductivity type first substrate and a first conductivity type or second conductivity type second substrate formed on an upper layer of said first substrate and which is higher in resistance than said first substrate.

11. A solid-state image pickup device according to claim 10, wherein said first conductivity type is N type and said second conductivity type is P type.

12. A solid-state image pickup device comprising:
a photosensor portion formed on the surface of a substrate to convert incident light into electric charges;
a transfer portion formed on the surface of said substrate to transfer said electric charges read out from said photosensor portion; and
an overflow barrier formed within said substrate to discharge unnecessary electric charges of said electric charges, wherein potential in an overflow barrier under said transfer portion is smaller than that in an overflow barrier under said photosensor portion.

13. A solid-state image pickup device according to claim 12, wherein said overflow barrier has at its area corresponding to the lower layer portion of said photosensor portion formed a

low concentration region with a concentration lower than that of the region other than said region in said overflow barrier.

14. In a method of manufacturing a solid-state image pickup device comprising a photosensor portion formed on the surface of a substrate to convert incident light into electric charges, a transfer portion formed on the surface of said substrate to transfer said electric charges read out from said photosensor portion and an overflow barrier formed within said substrate to discharge unnecessary electric charges of said electric charges, a method of manufacturing a solid-state image pickup device comprising the process of forming one or a plurality of impurity regions on a lower layer of said transfer portion in said substrate.

15. A method of manufacturing a solid-state image pickup device according to claim 14, further comprising the process of forming one or a plurality of second impurity regions on a lower layer of said photosensor portion.

16. A method of manufacturing a solid-state image pickup device according to claim 15, further comprising the process of forming said second impurity regions at the positions with depths different from that of said impurity region.

17. A method of manufacturing a solid-state image pickup device according to claim 14, further comprising the process of forming said overflow barrier at its region under said photosensor portion as a region with a concentration lower than that of the region other than said region in said overflow barrier.